Cyclones and gales.—Cyclonic activity was confined to the western, northern, and eastern parts of the ocean. On a great expanse of middle waters south of the 40th parallel there were few disturbances and the weather was for the most part settled.

Early in the month some storminess occurred over both northwestern and northeastern quadrants of the Pacific within the period 1st to 5th. Early on the 1st the American S. S. *President Coolidge*, Yokohama to Honolulu, ran into fresh gale winds in the morning near 35° N., 152° E. In the afternoon the wind rose to force 11 from the west. During much of the night and the early morning of the 2d, gales continued of force 10, finally moderating to force 7 late in the afternoon. A vessel to the northeast of her, near 41° N., 170° E., on the 2d, had a highest velocity of force 9 from the northeast. On the 3d and 5th, associated with a cyclone over northern Japanese waters, three vessels reported southerly gales of force 9 south and east of the Kuril Islands.

On May 3 to 5 a moderately deep cyclone affected the northeastern Pacific, and was central off Queen Charlotte Island on the 5th. It caused force-9 gales at some distance west of the Washington coast on the 4th and 5th, the nearest of which to the mainland was encountered by the American S. S. *J. A. Moffett* near 47° N., 130° W., during the night of the two dates.

On the eastern half of the California-Hawaiian routes a disturbance appeared near 30° N., 135° W., on the 9th and disappeared close to the central California coast on the 13th. In connection with it, gales of force 8–9 occurred on the 10th and 11th roughly within the area 30° to 40° N., and from near the central California coast westward to about 140° W. The lowest barometer, 989.5 millibars (29.22 inches) was reported on the 10th, near 36° N., 126° W., by the American S. S. *Matsonia.*

Most storminess along the northern trans-Pacific routes occurred south of the central and eastern Aleutians during two periods of cyclonic activity, the 9th and 10th and the 24th to 26th. Southeasterly gales of force 8 to 9, accompanied by only a small depression of the barometer, were reported on the 9th and 10th south and east of the vicinity of Dutch Harbor.

From the 24th to 26th the deepest cyclone of the month moved northward across the central Aleutians into the Bering Sea, causing southeasterly gales along the eastern half of the group and vicinity, and south of the western part of the Alaska Peninsula. The United States Coast and Geodetic Survey vessel *Pioneer* recorded the lowest known barometer of the month, 979.7 millibars (28.93 inches), near 52° N., 173° W., on the 24th, preceded by a force-9 gale. The same vessel on the 26th encountered an east-southeast gale of force 11 in practically the same position.

In the Gulf of Tehuantepec a northeaster of force 7 occurred on the 13th, associated with high pressure over the western Gulf States.

Fog.—With advance of spring, the usual increase in fog on the North Pacific was seen this month. But while normally the greatest increase occurs on northwestern waters, this year in May the rise in fog frequency was distributed along practically the entire extent of the northern and central routes. The majority of 5° ocean areas between 35° and 50° N., had from 1 to 3 days with fog, as well as several such areas between 30° and 35° N. Fog was reported on 4 days in the western part of the Japan Sea, and on 4 days along the eastern shore of the Gulf of Alaska. California coastal waters had 9 days and Lower California waters 8 days on which fog was observed.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

Except in the middle Plains States and Wyoming, precipitation during May was above normal throughout the western half of the country with amounts far above normal in most States. Minnesota, Wisconsin, and Louisiana had more than the usual amount for this month, but in all other States east of the Plains the amounts were below normal. Deficiencies were especially large from Kentucky and Virginia southward. South Carolina had only 13 percent of normal, Alabama 16 percent, and Georgia and Tennessee 26 percent. It was the driest May of record in Kentucky, Tennessee, Alabama, and South Carolina, and the second driest in Virginia, North Carolina, Georgia, and Mississippi.

For the winter and spring season (December to May) the East Central States, the entire Atlantic Seaboard except Florida, and the far Northwest showed a decided deficiency in precipitation.

Atlantic Slope and east Gulf of Mexico drainage.—Floods were entirely absent in this area and river stages were unusually low during May, except for flood stage at Pearl River, La., in the Pearl River, continuing from April until May 3. The mean monthly stage of the Connecticut River at Hartford, Conn., was 3.2 feet which is the lowest May mean river stage of record and the lowest reading of .0 foot during the month set a record low for May. Stream flow was considerably below normal in the Susquehanna River and approached a new all time low flow at Harrisburg, Pa., for May. In the Gulf drainage a low stage of 0.26 feet at Enterprise, Miss., on the Chickasawhay River, is the lowest stage of record for May in 37 years of record.

Upper Mississippi Basin.—From May 26 to the close of the month a quasi-stationary front extended in an east-west direction over the upper Mississippi River basin, situated between central Minnesota and central Iowa most of the time. Moderate to heavy rains occurred over this area during this time resulting in light to moderate flooding, and severe flooding in some localities.

Rains fell at a highly excessive rate in extreme northeastern Iowa and caused severe local flooding in this area. Reports on flood damages have not been obtained at this time.

Cautionary warnings were issued for the Root River and the Wisconsin River at Knowlton, Wis., stating that stages would approach flood stage. The damage from the high water was slight and confined to crop losses in the lowlands.

Stages in the main channel of the Mississippi River showed a gradual recession from the high water of April which was due to melting of the snow cover in the headwaters. The river was below flood stage except in the vicinity of Hannibal and Louisiana, Mo., where stages continued above flood during the first week of May.

Missouri River Basin.—A mass of Polar Maritime air moved rapidly southeastward across Nebraska and Kansas on May 19 and 20 with a cold front separating it from the tropical air to the south and east. Heavy rains occurred along the Kansas-Nebraska boundary as the warm moist air was lifted over the cold air mass. The rains were heavy over the Republican River watershed generally and especially on Medicine Creek. This creek was 4 feet above bankful during the night of the 19th and in the main channel the Republican River reached bankful and slightly above for about 15 miles in the vicinity of Guide Rock and Superior, Nebr.

Ohio River Basin.—Stages were unusually low during the month due to continued lack of precipitation. At Cincinnati, Ohio, the total precipitation for the first 5 months of the year, 6.05 inches was the least on record for that same period. In the Asheville, N. C., area the precipitation since August 1940 has been 50 percent of normal. The streamflow in the upper Tennessee River basin was near the all-time low during the month and the mean stage in the Ohio River at Cairo, Ill., for May was 16.3 feet, compared to the 60-year normal of 29.3 feet for that month.

Arkansas River Basin.—Heavy rains in the headwaters of the Canadian River in New Mexico at the close of April and the beginning of May caused severe flooding in that area. The river crested on the morning of the 3d at Union City, Okla., at a stage of 6 feet. Further heavy rains over this portion of the basin resulted in a second and higher crest of 10.8 feet at Union City on the night of the 4th. Crests at other points were 5.5 feet at Canadian, Tex., on the 3d, and 17.0 feet at Calvin, Okla., on the 5th.

Rains were again heavy during the latter half of the month, but flood stage was not reached as the result of these rains. However, flooding did occur in the North Canadian River at Woodward and Canton, Okla., on May 24–26 and at Yukon, Okla., stages were above flood the entire month. At Oklahoma City a stage of 14.0 feet was reached on May 4.

Red River Basin.—Heavy rains over the Little Missouri and Upper Ouachita watershed from May 4 to 6 resulted in flood stage being reached at Boughton, Ark., on the Little Missouri River and at Arkadelphia, Ark., on the Ouachita River, on May 7. At Camden, Ark., the Ouachita remained above flood stage from the 8th to the 14th, cresting at 31.8 feet (flood stage 26 feet) on May 10. The total loss has been estimated at $9,200 with a reported savings due to warnings of $5,000.

The Sulphur River reached record breaking stages early in the month with a crest stage of 32.0 feet at Ringo Crossing, Tex., on May 1, exceeding the high stage on June 17, 1935, and crest of 31.5 feet at Naples, Tex., on May 4, which is .2 foot lower than the record stage in May 19, 1930. These unusually high stages were the result of frequent rains during the spring months followed by heavy rains the latter half of April and the first of May.

The Little River, also a tributary of the Red River, reached flood stage at Whitecliffs, Ark., on May 3.

The Red River proper exceeded flood stage at Fulton, Ark., from May 8 to 11, at Grand Ecore, La., from May 10 to 18, and at Alexandria, La., from the 6th to 23d. The crest stage of 38.0 feet at Alexandria (6 feet above flood stage) occurred on May 16–17.

West Gulf of Mexico drainage.—The Trinity River which overflowed its banks twice during April at Dallas, Tex., was out of its banks at the close of April in the vicinity of Trinidad, Tex., and remained in flood there until May 17. At Dallas a flash rise reached a stage of 33.2 feet on May 6. In the lower reaches of the river stages were slightly above flood stage from May 7 to 26. The only report of damage was from Liberty, Tex., where losses amounting to $3,500 were sustained.

Heavy rains with resultant floods occurred over the watersheds of the Guadalupe and Nueces Rivers during the latter part of April and the first part of May. Extensive overflows from the Guadalupe covered 75,000 acres of farm lands as well as additional acres of pastures. Farm losses reached $78,500. The crest stage at Gonzales, Tex., was 31.3 feet on April 29, which is the highest stage during the past 4 years for that section of the Guadalupe. Another crest of 27.6 feet was reached on May 4. Along the lower portion of the river a crest of 29.5 feet occurred at Victoria, Tex., on May 3, equaling the crest of July 1940.

In the Nueces River the flood was confined to the lower portion where mostly pasture lands were flooded. The peak stage reached at Three Rivers, Tex., was 40.1 feet, and was the highest stage at that station in the past 5 years. Farm losses were estimated at approximately $7,100.

Moderate floods occurred also in the Brazos and Sabine Rivers from heavy rains during the first week of May. Flash floods in the smaller streams in Texas caused considerable damage. At Cameron, Tex., the Little River (tributary of the Brazos River) caused damage estimated at about $5,300. In the Plains and Panhandle sections of the State, excessive rains caused flash floods in local streams near Lubbock and Friona, Tex., with damage estimated at about $125,000.

The following report is made by the official in charge, Albuquerque, N. Mex., relative to floods in the Pecos River in New Mexico and the upper Rio Grande to and including Elephant Butte Reservoir Dam, N. Mex.:

The Pecos River was in flood stage from Artesia to Carlsbad at the beginning of the month and continued at that stage until May 5th. A flash flood occurred at 2 a. m., May 22, caused by excessive rainfall in the mountains west of Carlsbad. The greater portion of the water came down Hackleberry Draw and Dark Canyon. The river stage at Carlsbad changed from 8 feet to 20 feet within 2 hours. No lives were lost but considerable damage occurred. Several homes were washed away.

On the morning of May 23 at about 10 a. m., the second flood came down on Carlsbad from the same source as the first. This stage was considerably greater than the first one and did much damage. Although sufficient warnings had been issued 5 lives were lost in this second flood. About 111 homes were completely lost and 210 homes flooded and badly damaged; and about 1,500 people were homeless. So far, it has not been possible to obtain a fair estimate of the amount of damage to property and crops. This will be given in a later report.

The Pecos River reached flood stage the night of May 23 at Artesia and remained at high stage until close of the month. There was very little damage, however, from water in the main stream above Carlsbad. Flood waters in the Pecos caused the Red Bluff Dam to fill to capacity.

The Rio Grande was in flood stage from May 2 from Embudo to San Marcial. At the crest, about 25,000 second-feet were passing Albuquerque. The flood in this river has caused damage well over a million dollars, and a full report of the flood will be made as soon as the water subsides. As the river was still at flood stage at the close of the month, it is not practicable to make an accurate estimate of the damage. A full report of the flood in this river will be made at a later date.

The official in charge, El Paso, Tex., reports as follows on floods in the Pecos River in Texas and in the Rio Grande from Elephant Butte Dam to the mouth of the Pecos River:

Due to heavy thundershowers in the middle Pecos Valley watershed, in New Mexico on 4 days, beginning May 21, the Red Bluff Reservoir became full and began spilling on May 24. Heavy showers also fell in the Pecos River watershed in Texas immediately south of the Red Bluff Dam, during the same period, particularly on the 22d and 23d. A rapid, sudden inflow of water took place into the Pecos River and it overflowed at Mentone, Tex., about 20 miles south of the Dam, on the night of the 23d–24th. On the morning of the 25th the stage of the Pecos River at Pecos, Tex., 20 miles southeast of Mentone, was 8.7 feet, rising. Flood stage at Pecos is 13.0 feet.

River stages at Pecos during the remainder of the month were as follows: 26th, 12 feet, rising; 27th, 14 feet, rising; 28th, 14.4 feet, rising; 29th, 14.5 feet; 30th, 14.5 feet: and 31st, 14.5 feet.

The river enters a canyon at Sheffield, Tex., about 75 miles southeast of Pecos and remains therein until it empties into the Rio Grande and no overflows are possible.

The predicted overflows began to occur in the Pecos district on the 27th. Highways and 5,300 acres of irrigated farm land in Ward, Loving, and Reeves counties were flooded.

The flood continued after May 31. An effort will be made to obtain detailed estimates of loss when the flood subsides.

Heavy rains in the Rio Grande River watershed between La Nutria and Presidio, Tex., a distance of about 60 miles, on May 23 and 24, caused overflows in the River and arroyos in that section. The Presidio Valley is bordered both on the north and south by mountains, which are connected with the River by dry arroyos. This topographical formation, of course, is most favorable to quick run-offs.

Farm lands between Candelaria and Presidio were flooded both by adjacent arroyos and the River. The total losses from the two sources amounted to about $34,000 in Texas and $30,000 in Mexico.

While no flood stages were indicated in the lower Rio Grande, the river broke through some privately-owned levees below Brownsville, Tex., but no material damage resulted.

Gulf of California drainage.—High water and flooding occurred in the upper watershed of the Colorado River during the month. The high water resulted mainly from melting snow. Temperatures were unusually high in Colorado during the month and some rains occurred late in April and during the latter half of May.

There was considerable flooding in the Gunnison River which drains into the Colorado River above Grand Junction, Colo. The unusually high stage of 12.7 feet was reached at Delta, Colo., on May 14. In the Colorado River flood stage was exceeded slightly at Grand Junction with a peak stage of 11.2 feet on May 15. Damages have been estimated at $120,000 in this area.

The San Juan River, also a tributary of the Colorado River, was at flood stage from May 12 to 17 in the vicinity of Farmington, N. Mex. The river crested at 40,000 second-feet at that place on May 15. A further report on this flood will be made at a later date.

Pacific Slope drainage.—Stages above flood occurred in the Kings River at Piedra, Calif., several times during the month. The highest stage reached was 11.25 feet on May 24. The high water was due to the melting of snow in the elevated regions. Additional areas in Tulare Lake Basin are being flooded by the annual rise in the Kings, Kaweah, Tule, and Kern Rivers. These streams have not yet reached the seasonal peak.

Table of estimated flood losses and savings for May 1941

River and drainage	Tangible property	Prospective crops	Livestock and other movable farm property	Suspension of business	Total losses	Total savings
MISSISSIPPI SYSTEM						
Red Basin						
Ouachita River	$2,500	$2,000	$700	$4,000	$9,200	$5,000
WEST GULF OF MEXICO						
Trinity River	3,000			500	3,500	5,000
Brazos River	30,300	100,000			130,300	
Guadalupe River [1]	8,000	75,000	3,500	14,000	100,500	17,500
Nueces River [1]	2,500	4,600	350	1,800	9,250	
GULF OF CALIFORNIA						
Gunnison and Colorado Rivers	36,000	84,000			120,000	
Salt River [2]	196,300				196,300	

Data for Rio Grande and Pecos Rivers not available.

[1] April and May.
[2] Flood of March 1941.

FLOOD-STAGE REPORT FOR MAY 1941

[All dates in May unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	To—	Crest Stage	Date
EAST GULF OF MEXICO DRAINAGE	*Feet*			*Feet*	
Pearl: Pearl River, La	12	(1)	3		
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Mississippi:					
Hannibal, Mo	13	(1)	4		
Louisiana, Mo	12	(1)	(2) (3)		
Missouri Basin					
Republican: Guide Rock, Nebr	9	21	21	9 3	21
White Basin					
White:					
Georgetown, Ark	21	(1)	2		
Clarendon, Ark	26	2	5	26.2	4
Arkansas Basin					
Cimarron: Perkins, Okla	11	5	6	12.75	6
		22	22	11.9	22
		24	24	11.1	24
Neosho: Wyandotte, Okla	23	(1)	(2)	33.2	2–3
North Canadian:					
Woodward, Okla	5	5	5	5.0	5
		23	24	6.6	24
Canton, Okla	8	5	5	9.1	5
		21	21	8.5	21
		23	27	11.4	26
Yukon, Okla	8	(1)	(2)	[4] 13.0	23
Oklahoma City, Okla	12	4	5	14.0	4
(East) Oklahoma City, Okla	14	4	5	15.4	5
Canadian:					
Canadian, Tex	5	3	3	5.5	3
Union City, Okla	6	3	5	10.8	4
Calvin, Okla	15	5	5	17.0	5
Red Basin					
Little Missouri: Boughton, Ark	20	7	7	20.1	7
Ouachita:					
Arkadelphia, Ark	17	7	7	17.1	7
Camden, Ark	26	(1)	1		
		7	14	31.8	10
Little: Whitecliffs, Ark	25	2	4	25.4	3
Sulphur:					
Ringo Crossing, Tex	20	(1)	14	32.0	1
				27.0	11
Naples, Tex	22	(1)	19	31.5	4
Red:					
Fulton, Ark	25	5	5	25.0	5
		7	12	26.4	10
Grand Ecore, La	33	9	19	36.0	15
Alexandria, La	32	5	24	38.0	16–17
WEST GULF OF MEXICO DRAINAGE					
Sabine: Logansport, La	25	7	7	25.0	7
		8	15	26.4	12
Trinity:					
Dallas, Tex	28	5	7	33.2	6
Trinidad, Tex	28	(1)	17	36.2	14
Long Lake, Tex	40	10	16	41.6	13
Liberty, Tex	24	6	15	26.0	10–12
		20	26	24.9	24
Brazos: Waco, Tex	27	5	6	28.8	5
Colorado: Wharton, Tex	26	4	4	26.4	4
Guadalupe:					
Gonzales, Tex	20	(1)	1		
		3	7	27.6	4
Victoria, Tex	21	(1)	11	29.5	3
		23	24	22.3	23
Neuces: Three Rivers, Tex	37	(1)	1	39.5	Apr. 30
		4	8	40.1	5
GULF OF CALIFORNIA DRAINAGE					
Colorado Basin					
North Fork of Gunnison: Paonia, Colo	9	4	4	9.0	4
		8	15	9.9	13
		17	18	9.0	17–18
Gunnison: Delta, Colo	9	4	6	9.4	5
		7	20	12.7	14
		27	27	9.1	27
San Juan: Farmington, N. Mex	7	13	15	7.8	14
Colorado: Grand Junction, Colo	11	14	15	11.2	15
PACIFIC SLOPE DRAINAGE					
San Joaquin Basin					
Kings: Piedra, Calif. [5]	10	10	12	11.1	12
		17	18	10.35	18
		21	28	11.25	24

[1] Continued from previous month.
[2] Continued into following month.
[3] Occasionally at or above flood stage due to operations of Dam No. 24.
[4] Gage inaccessible during high water on May 5, 7, 23, 27–30; crest estimated.
[5] Data furnished by the Kings River Water Association.